

DENSE FOGS AT LINCOLN, NEBR.

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Air traffic is one of the subjects uppermost in the mind of the public to-day, and nearly every city of any size is establishing or already maintaining a suitable landing field. There is, however, one menace to aviation that man has not been able to eliminate, and that is fog. An aviator, by keeping his bearings, may fly his plane safely through or over fog layers; but when landing or taking off, fog is one of the most dangerous handicaps he has to contend with.

With the purpose of learning something of the frequency and duration of fogs at Lincoln a study was made of all dense fogs occurring during the 20 years 1908 to 1927, inclusive, and the data obtained have been tabulated and charted for ready reference. Averages for 20 years should give fairly accurate indications as to what to expect in the future.

Fog is classified by the United States Weather Bureau as light or dense. A light fog is one that does not obscure objects at a distance of 1,000 feet, and in its most common form, as observed at Lincoln, resembles light haze. A dense fog is one that obscures objects at a distance of 1,000 feet (about two and one-half ordinary city blocks) or less. No degree of density is considered in recording dense fog. Some are so dense they obscure objects at a distance of 25 feet, while others scarcely obscure objects at a distance of 1,000 feet, and the exact time of changing from dense to light or light to dense is rather difficult to determine.

Since light fogs have no important bearing on aviation, except to slightly decrease visibility, the study was confined to dense fogs, and in the discussion which follows when the word "fog" is used the reader will understand that dense fog is meant.

Dense fogs were recorded at Lincoln on 116 days during the 20 years. This is an average of slightly less than six days with dense fogs each year. With the exception of one day in January and two days in February, never more than one dense fog occurred on each day with fog, making a total of 119 dense fogs recorded.

During the 20 years dense fog actually prevailed a total of 354 hours and 33 minutes. This averages approximately about one hour of dense fog every three weeks. Fogs, however, are not evenly distributed throughout the year, a total of 92 hours of dense fog occurring during the 20 Februarys and none being recorded in May. January ranks second, with a total of 80.8 hours, and November third, with 39.7 hours. There were nearly as many hours of dense fog during the months of January and February as during all the other months.

TABLE 1.—Dense fogs at Lincoln, Nebr., during the 20 years 1908 to 1927

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Number of days with dense fog	17	23	10	3	0	5	5	4	17	6	16	10	116
Number of dense fogs	18	25	10	3	0	5	5	4	17	6	16	10	119
Number forming before noon	16	19	10	2	0	5	5	4	17	6	13	10	108
Number forming after noon	2	6	0	1	0	0	0	0	0	0	3	0	11
Total number of hours of dense fog	80.8	92.0	30.8	9.2	0.0	10.4	13.0	9.0	35.7	14.4	39.7	19.5	354.5

Table 1 gives the number of days with dense fog, the number of dense fogs recorded, the number forming

before noon, the number forming after noon, and the total number of hours of dense fogs for each of the 12 months and the total for the 20 years. Figure 1 shows the total number of hours of dense fog each month for the period.

There was a marked increase in the number of hours with dense fog from December to February, then a decrease from February to May. The decrease from September to October, the increase from October to November, and the decrease from November to December were quite noticeable. Fewer hours of dense fog were recorded during late spring and late summer than during any other part of the year, 9.2 hours being recorded during the 20 Aprils and 9 hours during the 20 Augusts. At no time during the 20 years did dense fog occur in May.

There was an average of approximately 1 hour of dense fog every week during January and February, 1 hour every 2 weeks during September and November, 1 hour every 3 weeks during March, 1 hour every 4 weeks during December, 1 hour every 6 weeks during October, 1 hour every 7 weeks during July, 1 hour every 8 weeks during June, 1 hour every 9 weeks during April, and 1 hour every 10 weeks during August.

Table 2 gives the total number of dense fogs forming at different times during the day for each month and for the 20 years.

TABLE 2.—Number of dense fogs which formed at the different hours during the 20 years 1908 to 1927 at Lincoln, Nebr.

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Number of fogs—													
Before 6 a. m.	7	8	6	2	0	5	2	2	11	4	6	1	54
Between 6 a. m. and 7 a. m.	4	5	4	1	0	0	3	1	4	2	1	3	28
Between 7 a. m. and 8 a. m.	4	2	0	0	0	0	0	1	2	0	5	4	18
Between 8 a. m. and 9 a. m.	1	3	0	0	0	0	0	0	0	0	1	2	7
Between 9 a. m. and 10 a. m.	0	0	0	0	0	0	0	0	0	0	0	0	0
Between 10 a. m. and 11 a. m.	0	0	0	0	0	0	0	0	0	0	0	0	0
Between 11 a. m. and noon	0	1	0	0	0	0	0	0	0	0	0	0	1
After noon	2	6	0	0	0	0	0	0	0	0	3	0	11

Dense fogs formed most frequently during the early morning hours, 82 dense fogs, or 69 per cent of the total number during the 20 years, forming between 5 a. m. and 7 a. m. Between 7 a. m. and noon, 26, or 22 per cent, formed. No dense fog formed between 9 a. m. and noon.

Eleven formed between noon and midnight, and these were recorded during January, February, and November. In no instance from March to October, inclusive, did dense fog form after 8 a. m. Of the 11 that formed during afternoon or evening 7 dissipated before midnight and 4 continued until after 6 a. m. Of these four one continued until 1 p. m. the next day, lasting 13 hours. The longest period of continuous dense fog was 16 hours and 15 minutes; this was on January 20 and 21, 1919, when a dense fog formed at 5:30 p. m. the 20th and continued until 9:45 a. m. the 21st.

Table 3 gives the number of dense fogs that dissipated during different hours of the day, for each month and for the 20 years.

TABLE 3.—Number of dense fogs which dissipated during the different hours, for the 20 years 1908 to 1927, at Lincoln, Nebr.

	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Number of fogs dissipating:													
Before 6 a. m.	0	0	3	0	0	2	0	0	0	0	1	0	6
By 7 a. m.	2	6	3	0	0	4	1	1	3	1	4	0	25
By 8 a. m.	5	7	6	2	0	5	3	2	10	4	8	1	53
By 9 a. m.	12	17	8	2	0	5	4	4	16	6	14	7	95
By 10 a. m.	14	17	10	3	0	5	5	4	17	6	15	10	106
By 11 a. m.	16	17	10	3	0	5	5	4	17	6	16	10	109
By noon	16	17	10	3	0	5	5	4	17	6	16	10	109

Dense fogs lifted most frequently between 7 a. m. and 10 a. m., 100 out of the 119, or 84 per cent, lifting between these hours. By 9 a. m. 95 fogs, or 80 per cent, had lifted, and by 10 a. m., 106, or 89 per cent.

TABLE 4.—Average duration of dense fogs at Lincoln, Nebr., for the 20 years 1908 to 1927

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Average duration:													
All fogs	h.m. 4 29	h.m. 3 41	h.m. 3 05	h.m. 3 05	h.m. 2 05	h.m. 2 36	h.m. 2 15	h.m. 2 06	h.m. 2 24	h.m. 2 29	h.m. 1 57	h.m. 2 59	
Those forming before noon	3 32	2 48	3 05	3 05	2 05	2 36	2 15	2 06	2 24	2 37	1 57	2 39	
Those forming after noon	12 08	5 28								1 55		6 15	

Table 4 gives the average duration of all dense fogs, and the average duration of those forming before noon

TABLE 6.—Total number of times dense fog occurred during the different hours of the day at Lincoln, Nebr., during a period of 20 years

Month	A. M.												P. M.												Total
	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	12-1	1-2	2-3	3-4	4-5	5-6	6-7	7-8	8-9	9-10	10-11	11-12	
January	2	3	3	3	4	4	9	11	15	12	6	3	2	2	1	0	0	0	1	1	1	1	1	2	87
February	3	2	2	2	2	2	10	14	14	14	6	5	4	4	2	1	1	1	1	3	3	3	2	2	103
March	0	2	2	0	2	1	3	7	7	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	32
April	0	0	0	0	1	1	2	3	3	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	12
May	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
June	0	1	2	2	0	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
July	0	0	0	1	1	1	3	5	4	3	2	0	0	0	0	0	0	0	0	0	0	0	0	0	17
August	0	0	0	1	1	1	2	3	3	7	2	0	0	0	0	0	0	0	0	0	0	0	0	0	13
September	0	0	0	0	0	0	11	15	14	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47
October	0	0	0	0	0	0	4	5	5	2	2	1	0	0	0	0	0	0	0	1	1	2	2	1	16
November	0	0	2	2	1	1	5	5	11	8	2	0	0	0	0	0	0	0	0	0	0	0	0	0	45
December	0	0	0	0	0	0	1	3	8	9	4	0	0	0	0	0	0	0	0	0	0	0	0	0	25
Total	5	8	11	14	12	12	53	73	85	60	21	9	6	6	3	1	1	1	2	5	5	6	5	5	409

Table 6 gives the total number of times dense fog was recorded during the different hours of the day for each of the 12 months of the year and the total for the 20 years, and Figure 2 shows the total number of times dense fog was recorded during each hour of the day for the 20 years. These values must not be confused with the total number of hours of dense fog as given in Table 1, as Table 6 and Figure 2 represent the total number of times dense fog was recorded during the different hours regardless of the portion of the hour the fog prevailed. Dense fog was recorded in 409 hours, while fog actually prevailed a total of 354 hours and 33 minutes during the 20 years. Table 6 and Figure 2 probably give a better representa-

tion of the time of the day dense fog was most common than could otherwise be presented by means of a short table or chart.

TABLE 5.—Number of dense fogs which lasted less than one hour, one, two, three, four, five, and six hours, and more than six hours at Lincoln, Nebr., during the 20 years 1908 to 1927

Stations	January	February	March	April	May	June	July	August	September	October	November	December	Annual
Number of fogs lasting—													
Less than 1 hour	2	1	1	1	0	0	2	1	3	0	2	2	15
1 to 2 hours	4	8	3	0	0	3	1	2	2	2	3	4	41
2 to 3 hours	4	8	3	0	0	3	1	2	2	2	3	4	25
3 to 4 hours	0	1	1	1	0	0	0	0	4	0	1	2	18
4 to 5 hours	0	1	2	1	0	0	0	1	0	0	1	0	6
5 to 6 hours	0	2	0	0	0	0	1	1	0	0	1	0	5
More than 6 hours	5	2	1	0	0	0	0	0	0	0	0	0	9

The average duration of all dense fogs was 2 hours and 59 minutes. The average of those that formed between midnight and noon was 2 hours and 39 minutes and of those that formed between noon and midnight was 6 hours and 15 minutes. These averages may be somewhat misleading, as four fogs that lasted more than 12 hours raised the average duration considerably. Of the 119 fogs, 76 lasted less than the average time of 2 hours and 59 minutes and 43 lasted longer. Slightly less than half of the dense fogs lasted less than two hours and 15 out of the 119 lasted less than one hour.

tion of the time of the day dense fog was most common than could otherwise be presented by means of a short table or chart.

Between 6 a. m. and 7 a. m. dense fog was recorded on 53 days, between 7 a. m. and 8 a. m. on 73 days, between 8 a. m. and 9 a. m. on 85 days, and between 9 a. m. and 10 a. m. on 60 days during the 20 years.

The hours between 2 p. m. and 7 p. m. were fairly free of dense fog. On only three days during the 20 years did dense fog occur between 2 p. m. and 3 p. m., and on only one day between 3 p. m. and 4 p. m., one day between 4 p. m. and 5 p. m., and one day between 5 p. m. and

6 p. m. Dense fog occurred on two days between 6 p. m. and 7 p. m.

The foggiest time of the day was between 7 a. m. and 9 a. m., when dense fog was recorded in 158 hours, or 39 per cent of the total number of hours in which dense fog was recorded. From 7 a. m. to 10 a. m. dense fog was recorded in 218 hours, or 53 per cent, and from 6 a. m. to 10 a. m., 271 hours, or 65 per cent.

Dense fog was recorded least frequently between 3 p. m. and 6 p. m., during which time it occurred in only three hours during the 20 years. From midnight to noon dense fog was recorded in 363 hours, or 89 per cent of the hours in which dense fog occurred, and from noon to midnight in 46 hours, or 11 per cent.

Figure 3 shows the actual time of every dense fog that was recorded during the 20 years, by months. The entry "DNA" means dense fog was first observed at 5.30 a. m., and these fogs were considered as beginning at 5 a. m. It is realized there may be some error in considering these fogs as beginning at 5 a. m., but in most cases the error is small.

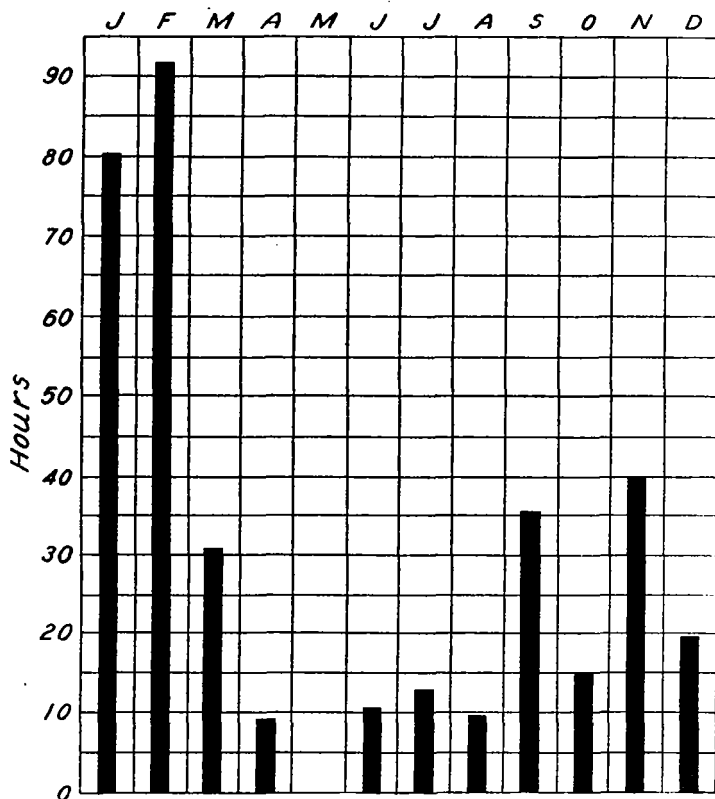


FIG. 1.—Total number of hours of dense fog for each month for the 20 years 1908 to 1927 at Lincoln, Nebr.

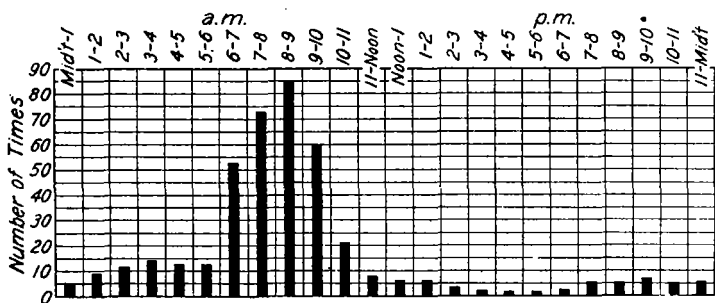


FIG. 2.—Total number of times dense fog occurred during the different hours of the day at Lincoln, Nebr., during a period of 20 years

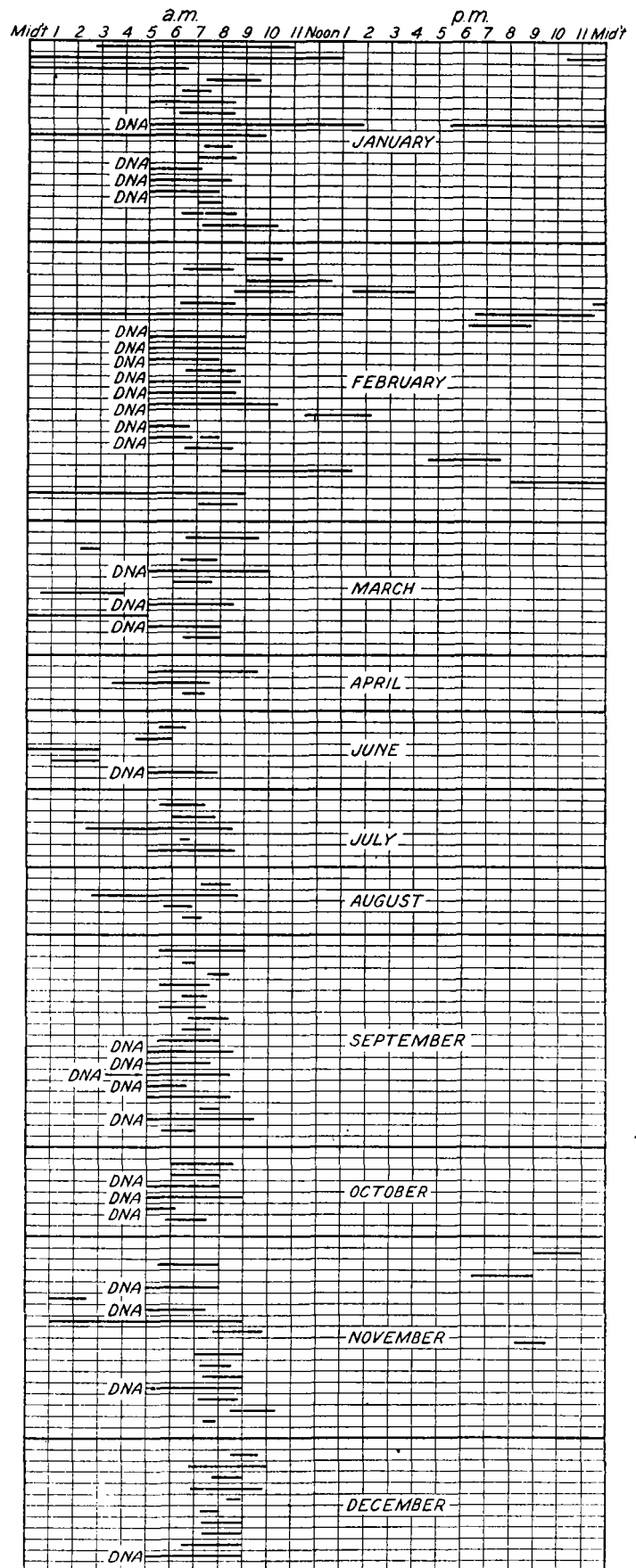


FIG. 3.—Hours of the day, by months, that dense fog prevailed at Lincoln, Nebr., during the 20 years 1908 to 1927, inclusive. DNA signifies during night after midnight